

REMARKS

Favorable reconsideration of this Application and the Office Action of August 25, 2005 are respectfully requested in view of the following remarks.

Claims 1 to 28 appear in this application. Claims 27 and 28 have been added by this response. The fee for two additional claims is submitted concurrently herewith. Claims 1 to 12 and 27 remain under consideration in this application. Claims 13 to 26 and 28 stand withdrawn from consideration under 37 CFR 1,142(b) as being directed to the non-elected invention. Applicant confirms the oral election of the invention set forth by the subject matter of claims 1 to 12. However, Applicant submits that non-elected use claims 13 to 26 and 28 should be rejoined with composition claims 1 to 12 and 27 upon allowance of the composition claims in accordance with the statements of the Federal Circuit court the case of *In re Ochiai*, 71 F. 3d 1565, 37 USPQ2d 1127 (Fed. Cir. 1995). Basis for the claims 27 and 28 is found in original claims 1 and 13 taken with the disclosure at paragraph [0013] on page 6 of the application.

It is noted with appreciation that the Examiner has indicated that the USPTO has withdrawn the previous of claims 1-12 under 35 U.S.C. 103 over Honda et al. (US 2001/0034313) or Lee (US 2004/0067860) in view of Applicant's previous response. It is also noted that the USPTO has not repeated and thus has withdrawn the rejection of claims 1-12 over Hara (US 2002/01218164) alone, although the present Office Action did not specifically state that.

The new rejection of claims 1-12 under 35 U.S.C. 103(a) as unpatentable over Hara et al. (US 2002/0128164) in view of Sahbari (US 6,455,479) is respectfully traversed. It is respectfully submitted that the combination of the disclosures in these cited documents do not render the claimed subject matter of claims 1 to 12 obvious to one skilled in the art, and the rejection is therefore erroneous and should be withdrawn.

It is submitted that a proper and complete understanding of the context of the present invention clearly shows the unobvious and patentable nature of the cleaning compositions of this invention. As microelectronic device fabrication has advanced certain new problems have developed. Due to issues with electrical performance and reliability in mass production, a variety of metal stacks are utilized for forming gate lines in FPD technology. Multiple metal layers such as Mo/AlNd/Mo, and especially double layers such as Mo/AlNd, AlNd/Ti, and AlNd/Cr are common for gate line metal stacks in current manufacturing of FPD technologies. However, in stacks where the AlNd alloy is located beneath another metal, aluminum corrosion during the rinse step can be a critical problem for electrical performance. This corrosion is commonly known as overhang and can create voids that weaken the metal structure. Loss of aluminum to corrosion during the chemical cleaning or water rinse steps can also create notching in the metal lines, which is a most common defect at FPD technology. The composition of the cleaning solution and its behavior in water plays a key role in causing corrosion. A typical photoresist remover for FPD applications might include polar organic solvents blended with organic amines and other solvating agents. Amines have been shown to increase the effectiveness of photoresist removal in solvent blends. However, the water rinse following use of this type of cleaner or remover can create a strongly alkaline aqueous solution and that can lead to considerable loss of metal from the patterned lines. This necessitates an intermediate rinse between the cleaning/stripping step and the aqueous rinse. Such an intermediate rinse, typically with isopropyl alcohol, adds undesirable time, safety concerns, environmental consequences, and cost to the manufacturing process. Thus, there was a need for a **non-aqueous** alkaline-containing stripping and cleaning compositions for photoresists that enable one to completely remove both photoresist and etch and/or ash residue from the microelectronic substrate **yet not produce any significant metal corrosion during a subsequent aqueous rinse step**, especially for FPD microelectronic elements.

The present invention addressed this problem and need for a **non-aqueous** cleaner/stripper/remover that would not produce such undesirable corrosion in a subsequent

aqueous rinse and not require any intermediate rinse. The problem is addressed by the **non-aqueous** cleaning compositions of the present invention.

The compositions disclosed in the Hara et al document are entirely different than the compositions of the present invention. The compositions of Hara et al. are **aqueous compositions** that **must contain a peroxide oxidizing agent and a quaternary ammonium salt**, neither of which is employed in Applicant's **non-aqueous** compositions. Furthermore, Hara et al. fail to disclose that the cleaning compositions **must** contain a nucleophilic amine, a moderate to weak acid having a strength expressed as a "pKa" for the dissociation constant in aqueous solution of from about 1.2 to about 8, a compound selected from the group consisting of an aliphatic alcohol, diol, polyol or glycol ether, and an organic co-solvent, and the weak acid component (b) must be present in the composition in an amount such that the equivalent mole ratio of acid/amine is greater than .75 and that the composition has a pH of from about 4.5 to 9.5. No such composition is disclosed, taught or even remotely suggested by the disclosure in Hara et al.

Hara et al. only optionally has an amine component. The acid component in Hara et al. is also optional and only as a corrosion inhibitor, not as a neutralizer for a nucleophilic amine component. Nothing in Hara et al teaches that both these "optional" components must both be present and that a moderate to weak acid of pKa of about 1.2 to about 1.8 must be employed when a nucleophilic amine is employed and that the acid must be present in the composition in an amount such that the equivalent ration of acid/amine is greater than 0.75 and that the composition has a pH of from about 4.5 to 9.5.

Furthermore, when one looks at what Hara et al. actually disclose, the differences from the present invention become even more apparent. Every example of a composition of Hara et al. is an aqueous composition having a very significant amount of water. In Table 1 the amount of water in the compositions ranges from 60 to 90%, in Table 2 the amount of water ranges from 25 to 90%; and in Table 3 the water ranges from 55 to 90 %. In contrast, Applicant's claimed compositions are non-aqueous compositions. Nothing in

Hara et al. teaches one to eliminate the water and provide a non-aqueous composition, nor to eliminate the absolutely critical peroxide or quaternary ammonium salt components of Hara et al.

The Office Action, in the paragraph bridging pages 4 and 5 of the Action, correctly states that Hara et al. does not “teach a composition containing the specific amount of acid (corrosion inhibitor) or teach, with sufficient specificity a composition having a specific pH containing a nucleophilic amine, a moderate to weak acid, a glycol ether, a cosolvent, and the other requisite components of the compositions in the specific proportions as recited by the instant claims.” It might also be added that Hara et al. fails to require a non-aqueous composition, and in fact, teaches away from such a composition.

To cure the defects in Hara et al., the USPTO relies upon the disclosure in Sahbari. Such reliance is clearly misplaced. The Office Action relies upon the disclosure in Sahbari at col. 6, lines 10-45 of “a stripping composition containing various ingredients including corrosion inhibitors such as triazoles, gallic acid, etc. which may be present in amounts of 0.01% to 10% by weight.” Now clearly, such a disclosure in Sahbari does not address all or even any of the deficiencies of Hara et al. as mentioned above and in the Action.

Firstly, Sahbari, like Hara et al., discloses and teaches only **aqueous** compositions containing up to 75% water, more preferably 10-35%—col. 4, lines 44-53. Thus, no combination of the teaching of Sahbari and Hara et al. could possibly teach a **non-aqueous composition** of the present invention. The combination of the aqueous compositions of Sahbari with those of Hara et al. can only result in aqueous composition that must contain water, a peroxide, and a quaternary ammonium salt, such compositions not being those of the present claims. Secondly, there is no specific disclosure in Sahbari to teach specifically a composition having both a nucleophilic amine and a moderate to weak acid and to do so in the relative proportions of nucleophilic amine and moderate to weak acid to be such as to provide an equivalent mole ratio of acid/amine greater than 0.75, the composition to have a pH of about 4.5 to 9.5, and for the composition not to have

a peroxide or quaternary ammonium salt. Thus, the combination of the two aqueous compositions of Hara et al and Sahbari does not result in a **non-aqueous** composition of the present invention that have the other specifically recited requirements. It is thus readily apparent the conclusion statements of obviousness as set forth on pages 5 and 6 of the Action are bald assertions with factual basis in the reference disclosures, are contrary to the disclosures in the references, and have been made by the USPTO solely based on the hindsight of the disclosure of the composition of the present invention in Applicant's specification. Broad conclusionary statements in the prior art that have no specificity with respect to the specific requirement(s) of the claimed subject matter provide no valid legal or factual basis for a Section 103 rejection. The references, in and of themselves and without benefit of an applicant's disclosure, must provide the **specific motivation** to lead one skilled in the art to make **all** the specific modifications required to lead one to the claimed invention. Clearly no such specific teachings are present in the cited prior art here to provide such motivation to lead one to the non-aqueous compositions of the present claims and, therefore the rejection is factually and legally deficient and erroneous.

Therefore, the USPTO is respectfully requested to reconsider and withdraw the 35 U.S.C. 103 rejection of claims 1-12 over Hara et al. in view of Sahbari.

For at least the above reasons, applicants respectfully request that the rejection of claims 1 to 12 under 35 U.S.C. 103 over Hara et al. in view of Sahbari be reconsidered and withdrawn. Claim 27 is likewise patentable over Hara et al. in view of Sahbari for at least the same reasons.

After withdrawal of this rejection Applicant request rejoinder of claims 13 to 26 and 28 with claims 1 to 12 and 27, per *In re Ochiai*, 71 F. 3d 1565, 37 USPQ2d 1127 (Fed. Cir. 1995).

It is respectfully submitted that the foregoing is a full and complete response to the

Office Action and that all the claims are allowable for at least the reasons indicated. An early indication of their allowability by issuance of a Notice of Allowance is earnestly solicited.

Respectfully submitted,



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Date: October 4, 2005